

PATENT COOPERATION TREATY

PCT

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference JGP/B429WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/02506	International filing date (day/month/year) 10.06.2003	Priority date (day/month/year) 11.06.2002
International Patent Classification (IPC) or both national classification and IPC B60T8/00		
Applicant AIRBUS UK LIMITED et al.		



- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 05.01.2004	Date of completion of this report 14.10.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Marx, W Telephone No. +49 89 2399-2722 

**INTERNATIONAL PRELIMINARY
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International application No. **PCT/GB 03/02506**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-28 as originally filed

Claims, Numbers

1-17 as originally filed

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-17
Inventive step (IS)	Yes: Claims	
	No: Claims	1-17
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents (D):
 - D1: GB-A-1 018 548 (NORTH AMERICAN AVIATION INC) 26 January 1966 (1966-01-26)
 - D2: US-A-4 958 512 (JOHNSEN ODDVARD) 25 September 1990 (1990-09-25)
 - D3: GB-A-1 077 636 (MATERIELS HISPANOSUIZA SOC D E) 2 August 1967 (1967-08-02)
 - D4: US-A-5 167 385 (HAEFNER HANS W) 1 December 1992 (1992-12-01)
 - D5: US-A-4 613 190 (JOHNSON STUART E) 23 September 1986 (1986-09-23)
2. The present application does not meet the requirements of Article 33(2) PCT, because the subject-matter of claim 1 and claims 15-17 is not new.
- 2.1 Claim 1 describes a method of applying a braking force to a wheel of an aircraft moving along the ground, comprising the steps of
 - estimating the conditions at which the wheel would skid, taking into account the vertical load, and
 - dependent from said estimation, applying a braking force to the wheel.

Hence, claim 1 defines an anti-skid control for an aircraft wheel which takes into account the vertical load, which is already known from the prior art cited in the search report:

- D1 discloses an antiskid control for a landing aircraft (see page 1, line 11-16), with determination of wheel slippage and vertical load (see page 5, lines 9-10 and 37-44). Using these parameters, a second loop of the brake control system is controlled (see page 5, line 47-81).
- D2 shows a comparable control, where the slip factor providing maximum friction coefficient is sought by measuring vertical and horizontal forces (see col.3, line 22-26 and col.4, line 50-53).
- D4 shows that an antilocking system is optimally adjusted by combining slippage of wheels and measured vertical load (see col.6, line 17-25).
- By calculating the drag force, the aircraft landing computer according to D3 takes into account changes of vertical load (see page 3, line 20-28).
- Since claim 1 does not specify whether the vertical load is estimated in real

time or beforehand, also D5 - applying a preset braking force which takes into account the change of vertical load during landing (see col.6, line 15-24) in order to reduce skid activity (see col.6, line 56-61) - appears to show all features of claim 1.

Consequently, the subject-matter of claim 1 lacks novelty.

- 2.2** Claims 15 to 17 relate to a corresponding braking control apparatus, to a control unit and landing gear assembly and to an aircraft including said components, comprising a processor receiving vertical load signals in order to perform a calculation as described in claim 1.

As described in the preceding paragraph, a direct measurement of vertical load in an aircraft braking system is described in D1, D2 or D4. Hence, the subject-matter of claims 15-17 is not new in view of the disclosure of D1, D2 or D4.

- 3.** Dependent claims 2-14 do not appear to contain any additional features which, in combination with the features of any claim they refer, meet the requirements of the PCT with respect to novelty and inventive step, the reasons being as follows:
- Claims 2-4** - effective braking according to claim 2 close to the peak of the friction coefficient/slip curve is known from D2 (see col.6, line 31-39), using the detected horizontal force for a reference as claimed in claim 3. D2 also takes into account a variable relating to time according to claim 4 (see col.5, line 65-67) by computing the sense of change of the friction coefficient, which provides an indication when the wheel is likely to skid.
 - Claim 5** - see above paragraph 2.1.
 - Claims 6-10** - D2 discloses the subject-matter of said claims, i. e. records force data in order to determine the coefficient of friction/slip-factor curve (see col.3, line 22-35) and controls braking force at the maximum value of said curve (see col.4, line 19-30). D4 shows the additional features of claims 6, 7 and 10, i. e. wheel slippage is determined and combined with vertical force data (as a "slip parameter") in order to ascertain the wheel friction coefficient (see col.6, line 17-25).
 - Claim 11** - a prediction regarding how the vertical load will change during landing is disclosed in D5 (see Fig.5b).

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Claim 12 - optimally adjusting the braking force during skidding, taking into account the vertical load data, is known from D4 (see col.6, line 17-25).

Claims 13,14 - a hydraulic braking system according to claim 13 is known from D2 (see col.5, line 36-41), which discloses that a horizontal force is measured (see col.5, line 63-65) which is representative of the hydraulic braking pressure. Since D2 also takes into account measurement data on vertical load when controlling braking force (see col.5, line 62 - col.6, line 1), the additional feature of claim 14 is also known.